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AUTHOR Jones, Marion
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ABSTRACT

Several intermediate performance objectives and corresponding criterion measures are listed for each of five terminal objectives presented in this curriculum guide for a basic gasoline engine mechanics course at the secondary level. (For the intermediate course guide see CE 010 946.) The materials were developed for a two semester (2 hours daily) course to provide training in the terminology, construction, and function of both two-and four-cycle internal combusion engines. The course includes instruction and practical experience in the areas of safety, care and use of tools and manuals, theory of internal combustion, ignition and electrical systems, fuel systems, and troubleshooting. The titles of the five terminal objective sections are Orientation, Hand Tools, Engine Construction, Ignition, and Fuel System. (This manual and 54 others were developed for various secondary level vocational courses using the System Approach for Education (SAFE) guidelines.) (HD)

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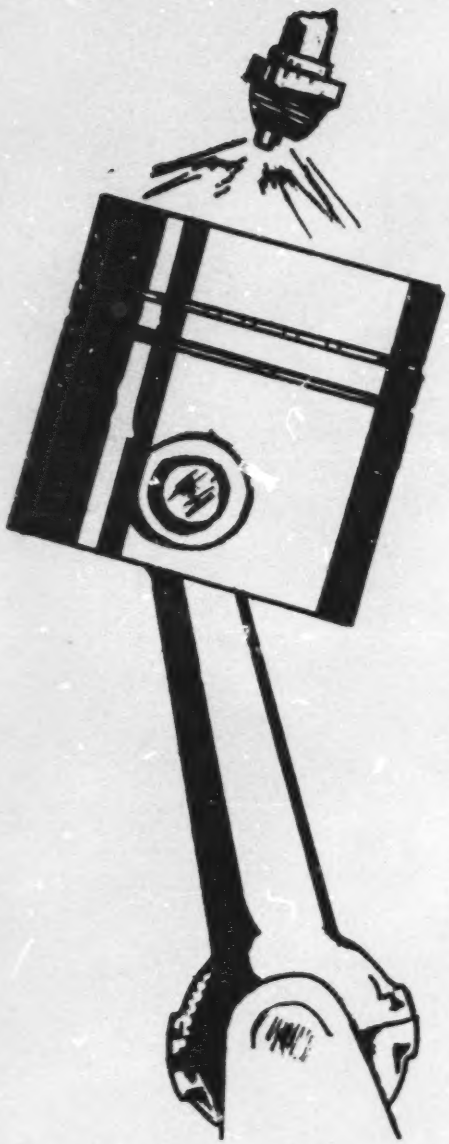
GASOLINE ENGINE MECHANICS

PERFORMANCE OBJECTIVES

BASIC COURSE



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July, 1973

ACKNOWLEDGEMENTS

This manual was developed using System Approach For Education (SAFE) Guidelines.

Appreciation and recognition are extended to the following educators who have assisted in the preparation of this manual:

Writer: Marion Jones, Instructor

Technical Assistance: Joseph Killough, Coordinator

Editing: Charles Downing, Supervisor

Cover Design & Printing: Chester Sievert, Instructor

Typist: Miss Catherine Boatright

CURRICULUM OBJECTIVE

Design, develop, implement a three year curriculum in Gasoline Engine Mechanics for Duval County students.

Upon completion of this program 85% of the students will achieve 75% proficiency on the following:

1. Teacher-made test (attached)

2. Practical demonstration of skills developed (attached)

Although attendance, mathematics, science and communications necessary to succeed in this field of employment are taught as related information, it is expected that a student entering this special course will already have an adequate general education upon which this course may be presented. This will enable him to grasp and retain what is taught. A student who enters this course and does not possess the essential foundation may not expect to succeed beyond mediocre attainment.

GASOLINE ENGINE MECHANICS - BASIC

Accreditation No. 9363

Length of Course: 2 Semesters

Time Block: 2 Hours Daily

COURSE DESCRIPTION

This 360 hour course provides training in the terminology, construction, and function of both two & four cycle internal combustion engines. The course includes instruction and practical experience in the following:

a. Safety

b. Care and use of hand tools and manuals

c. Theory of Internal Combustion

d. Ignition and electrical systems

e. Fuel Systems

f. Troubleshooting

GASOLINE ENGINE MECHANICS - BASIC

#9363

Syllabus of Terminal Performance Objectives

0.0 Curriculum Objective

1.0 Orientation

2.0 Hand Tools

3.0 Engine Construction

4.0 Ignition

5.0 Fuel System

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 1.0 — Orientation

The student will demonstrate his familiarity of job opportunities and shop practices by answering correctly 4 of 5 questions given.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		1.0	See Attached Test
.1	Given a list of job titles, the student will select with 100% accuracy the titles related to this field.	1.1	Circle those areas related to this field: Marine Mechanics Ind.Eng. Mechanics Parts Manager Service Manager Field Representative Steam Fitter Air Craft Mechanics Diesel Mechanics Electrical Mechanics
.2	Given a print out of general shop area student will locate position of all fire ext, on the print out.	1.2	Mark locations of all fire extinguishers on the shop blueprint.
.3	The student will identify orally or in writing at least 5 safety regulations	1.3	Write 5 safety regulations pertaining to the gasoline engine repair shop.

TPO 1.0

1. What information is necessary when making out a work order?

2. Name two of the most common small engine manufacturers.

3. What is the minimum wage for a starting mechanic in this trade area?

4. Name two fields that are related to the small engine field.

5. Name at least two sources you would try if looking for a job.

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0 — Hand Tools

The learner will demonstrate knowledge and skill developed in the purpose and use of given hand tools, service manuals, and parts catalogs as evidenced by 80% of the students' achieving 75% or better on a written exam and on each I.P.O. Criterion Measure.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		2.0	Attached.
2.1	Given 10 incomplete sentences, concerning hand tools, the student will select the correct word or words to complete all ten sentences correctly.	2.1	1. The _____ is the proper tool used to determine the outside diameter of an item for out-of-round condition. a. Scale b. Inside caliper c. Micrometer 2. Using a 6" scale, the distance across the top of a cylinder is 3½". This is called the _____. a. Stroke b. Torque c. Bore 3. A tool inserted in a hexagon shaped recesses of flush mounted screws is: a. Inside caliper b. Inside micrometer c. Set screw wrench 4. The end of a Phillips-type screwdriver is: a. Flat Blade b. Pointed end with 4 grooves c. Fluted end 5. A screw extractor has: a. Tapered right-hand threads b. Tapered left-hand threads

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

Hand Tools

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
			(cont'd)
		2.1	6. Hacksaw blades are made of: a. High grade tool steel b. Chilled cast iron c. Carbaloy
			7. A _____ is used to cut external threads. a. Tap b. Set Screw c. Die
			8. After cutting a piece of tubing, it should be reamed to remove any _____ from the cut edge. a. Lip b. Grooves c. Burrs
			9. The usual cutting lip angle on a twist drill is _____. a. 45 deg. b. 59 deg. c. 60 deg. d. 75 deg.
			10. The main reason for using a box type wrench is _____ _____. a. greater strength b. used on rounded nuts c. less liable to slip from nut.

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COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0 Hand Tools

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
2.2	Given (4) Engine Discrepancies, the student will be able to locate the corrective action steps necessary to repair the problem in the appropriate service manual.	2.2	Complete the following by writing in the answer of the steps necessary to locate the discrepancy using the appropriate service manual: A. If poor compression, look for: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ B. If no compression, look for: 1. _____ 2. _____ C. If spark does not occur, look for: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ D. During the carburetion check, the spark plug is found dry, look for: 1. _____ 2. _____ 3. _____ 4. _____
2.3	Given a parts manual, the student will demonstrate the ability to recognize a part, (verbally described by the instructor) in the parts manual, and write the correct part number for any given item.	2.3	1. Using a parts manual provided, write the correct ref. no. and part no. for the following items from a (Model 60102 type 0015 ser. no 701006-1) engine: A. Connecting Rod B. Crankshaft C. Intake Valve D. Spark Plug

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 2.0

Hand Tools

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		2.3	(cont'd) 2. Using a parts manual provided, list the part number and nomenclature of the following terms: a. reference no. 7 b. reference no. 300 c. reference no. 16 d. reference number 195 The items will be used on an engine described as: Model 60102 Type 0015 S/N 701006-1 3. Describe in writing the difference between: A. Service manual & Parts Manual B. Reference no. & Parts no. 4. Describe the source code symbols found in the parts manual.

Student name _____ Date _____

1. On the next page you will see pictures of wrenches, each of which has a small number next to it. Look at the picture, and place the number on this sheet next to the proper name for that wrench.

( ) UNIVERSAL JOINT	( ) VICE-GRIP WRENCH
( ) SQUARE SOCKETS	( ) SPEED TEE
( ) EXTENSION BAR	( ) COMBINATION WRENCH
( ) OPEN END WRENCH	( ) SLIDING T HANDLE
( ) DOUBLE HEXAGON SOCKETS	( ) RATCHET HANDLE
( ) SPEEDER	( ) FLARE NUT WRENCH
( ) DOUBLE OFFSET BOX WRENCH	( ) SPINNER HANDLE
( ) SET SCREW WRENCH	( ) RATCHET ADAPTER
( ) SOCKET WRENCH SET	( ) PIPE WRENCH
( ) FLEXOCKETS	( ) FLEXTENSION
( ) MONKEY WRENCH	( ) SPANNER WRENCHES
( ) ADJUSTABLE END WRENCH	( ) FLEX HANDLE
( ) TORQUE WRENCH	( ) DEEP DOUBLE HEXAGON

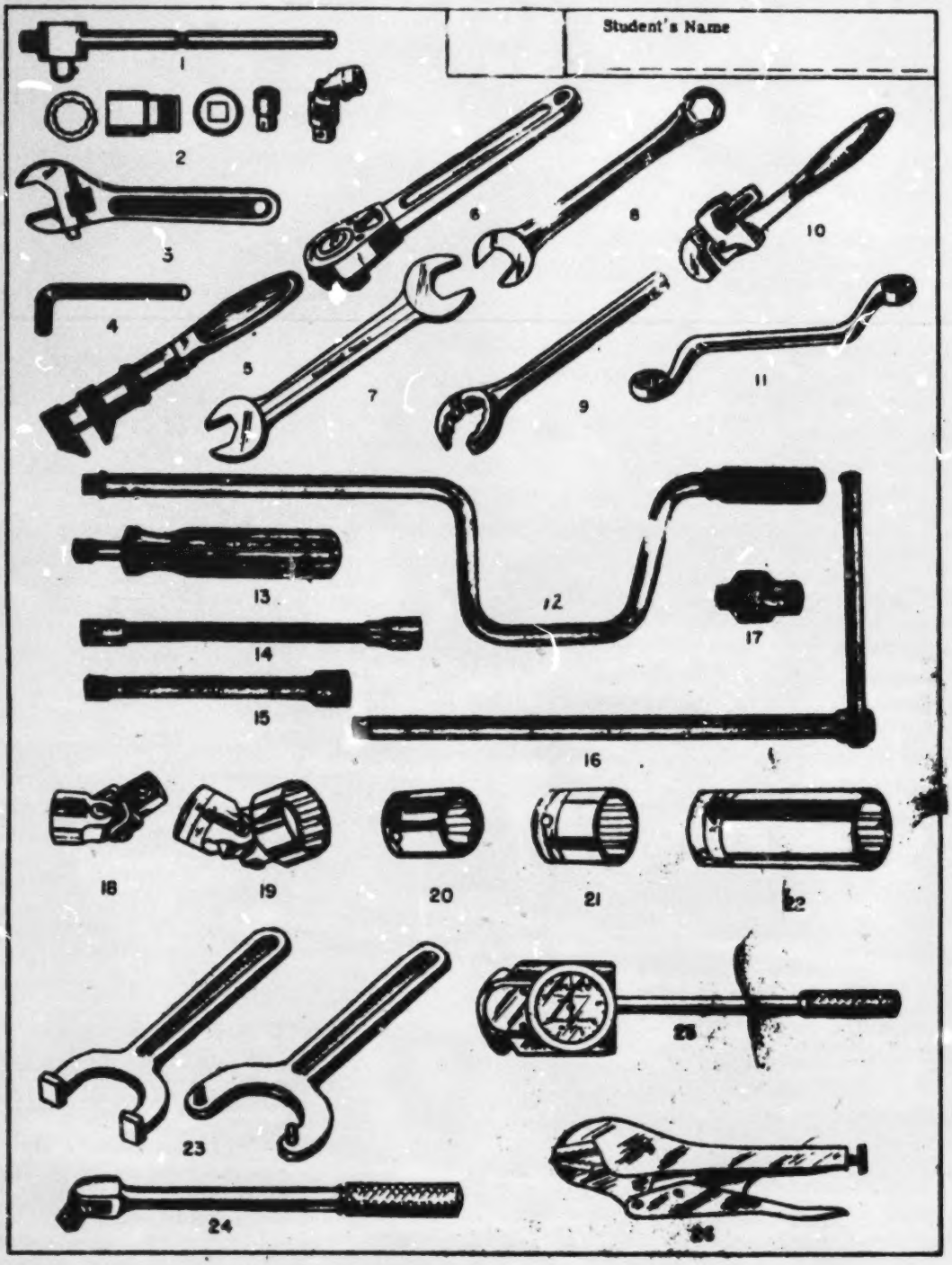
2. Place the number, or numbers, of the tools on the blanks after the statement which best describes their use and purpose.

(1) When a socket, box or end wrench cannot be used _____

(2) In a hollow set screw _____

(3) In tightening nuts to a specified tension _____

(4) When a particularly tight grip is required _____


Student's Name
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26

(2.0) Special Tools (Measuring)

- T E S T -

1. On the attached sheet the figures are numbered. Insert the figure number in the space next to the name of the tool to which it corresponds.

( ) Snap gage, adjustable type
( ) Inside caliper
( ) Steel Rule
( ) Thickness gage
( ) Micrometer caliper
( ) Telescoping gage
( ) Outside caliper
( ) Steel Tape-rule
( ) Dial indicator
( ) Tap and drill gage
( ) Plug or "no go" gage
( ) Snap gage, plain type
( ) Screw-pitch gage

2. In the space provided below, give the dimensions numbered 1 through 24 in Figure 2:

1._____ 5._____ 9._____ 13._____ 17._____
2._____ 6._____ 10._____ 14._____ 18._____
3._____ 7._____ 11._____ 15._____ 19._____
4._____ 8._____ 12._____ 16._____ 20._____

21._____
22._____
23._____
24._____

3. Place the number or numbers of the tools (Figure numbers) on the blanks following the statement which best describes the use and purpose, or ask yourself, "Used to measure what?"

A. The size of a drill _____
B. Limits on outside diameters _____
C. Either common fractions to sixty-fourths of an inch or decimal fractions to one-hundredths of an inch _____
D. The number of threads per inch of a bolt or a nut. _____

4. In figures 14 to 18 inclusive, insert the correct decimal fractions in all of the blank spaces below:

Fig. 14 a._____ b._____
Fig. 15 a._____ B._____
Fig. 16 a._____ b._____
Fig. 17 a._____
Fig. 18 a._____

Student's Name

FIG. 1

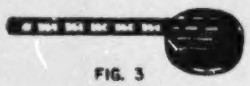


FIG. 3

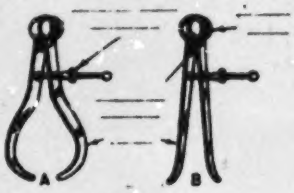


FIG. 4

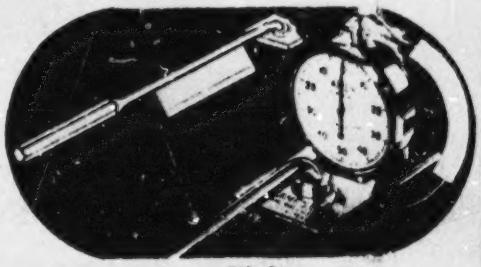


FIG. 5

FIG. 6

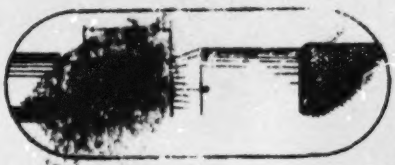


FIG. 14

FIG. 7

FIG. 8

FIG. 13

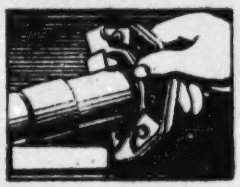


FIG. 12

FIG. 9

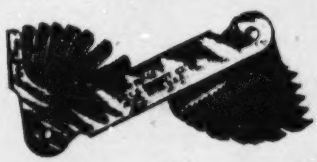


FIG. 10

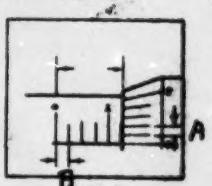
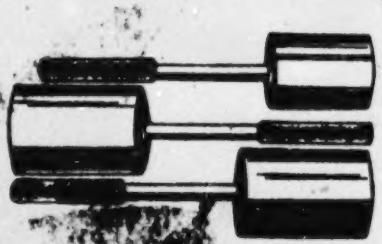


FIG. 15



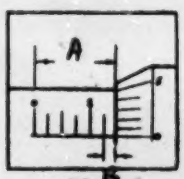


FIG. 16

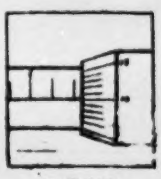


FIG. 17

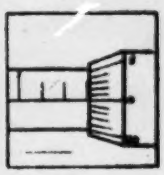


FIG. 18

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0 — Engine Construction

90% of the learners will with 85% accuracy complete a criterion referenced examination on small gasoline engine construction, will identify each stroke in a 4 stroke cycle engine, will identify given parts and will sketch each event in a 4 stroke cycle engine.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		3.0	1. The major difference between a two-stroke and four-stroke cycle engine is _____ _____ _____
			2. From the attached sheet, pick out the proper nomenclature for the parts with the arrow. (See attached)
			3. Viscosity is _____ _____ _____.
			4. Volitility is _____ _____ _____.
			5. The cylinder head bolts must be installed and tightened according to a _____ and _____ prescribed by the individual engine manufacturer.
			6. Lapped valves must contact the seat with _____" and have a min. margin above _____".
			7. What tool is used to measure a c/s for out of Round? _____
			8. Worn bearings should be: a. replaced b. reamed smooth
			9. Insert the name to the section of the piston that the arrows are pointing: (See Attached)

ACCREDITATION NUMBER 9363

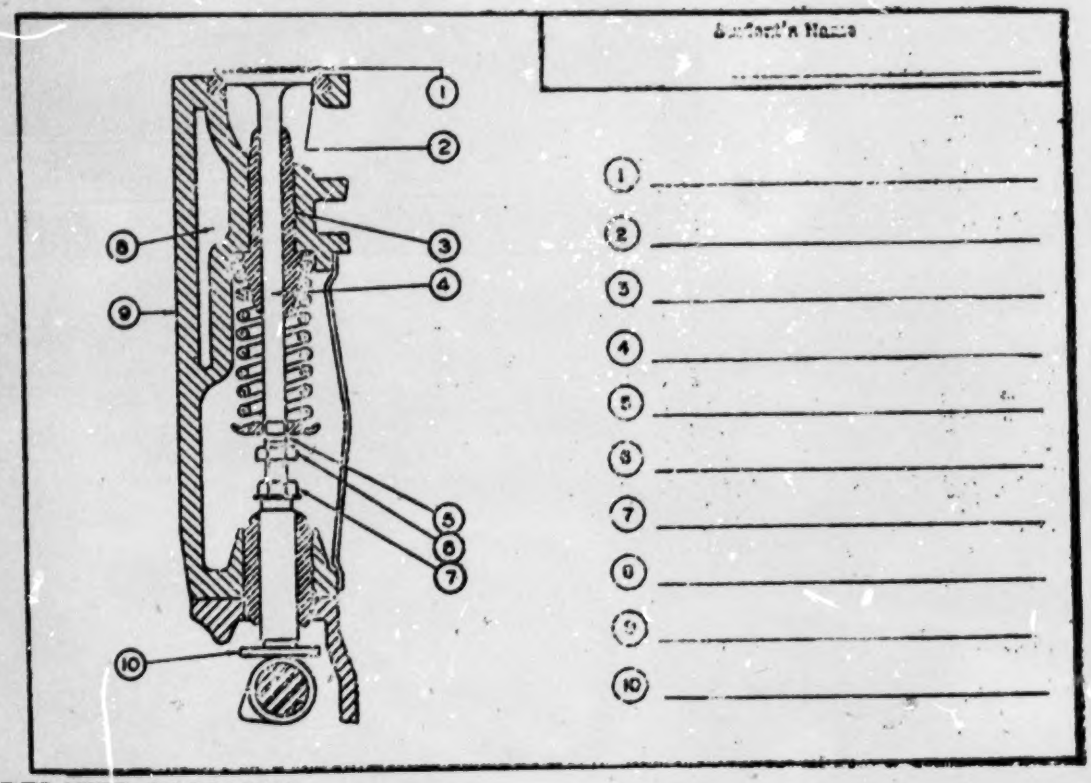
COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0 — Engine Construction

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		3.0	(cont'd) 10. A piston is considered worn out if a _____ feeler gauge fits between the groove and the top ring. 11. Scratches below the rings indicate: 1. dirty air filter 2. no air filter 3. dirty oil 4. discolored oil 12. SAE _____, MS-oil is recommended for power mowers. 13. Timing of the engine is accomplished by _____ the cam shaft and the crank shaft. Timing mark.

TEST
(TYPICAL)

1. Study the cross section drawing of the valve in block assembly and identify the parts by lettering the part names in the space provided for each.



RELATED PROBLEMS

1. **What returns the valve to its seat after it has been raised by the cam?** _____

2. **Why is it necessary to have some clearance between the valve and valve lifter?** _____

Student's Name _____

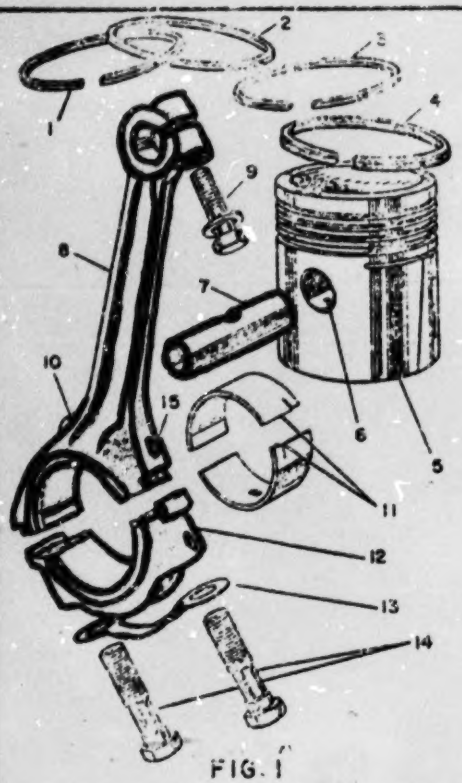


FIG. 1

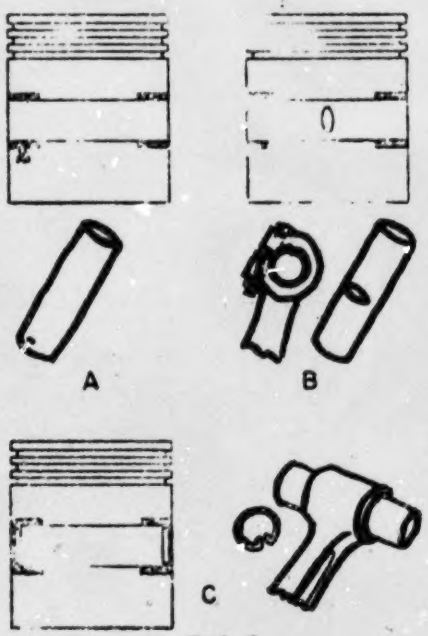


FIG. 2

ASSIGNMENT

A ◊ Label the components indicated by numbers 1 to 15 in Figure 1.

B ◊ Identify the types of piston-pin locking in Figure 2 by inserting the letter in the space next to the name to which it corresponds.

1. ( ) Full-floating pin 2. ( ) Fixed pin 3. ( ) Semifloating pin

REFERENCES	Pages
Auto. Fundamentals	60, 61, 67-69
Auto. Mechanics	24-29, 60, 79-81

RELATED PROBLEMS

1. What is the main reason for locking the piston pin in the connecting rod or piston? _____

2. Describe briefly the three types of piston-pin locks as shown in Figure 2.

   a. _____

   b. _____

   c. _____

RELATED PROBLEMS

1. Name the two basic types of piston rings.

   a. _____ b. _____

2. From what type of material are piston rings generally made?

   _____.

3. State three functions of piston rings. a. _____

   b. _____

   c. _____

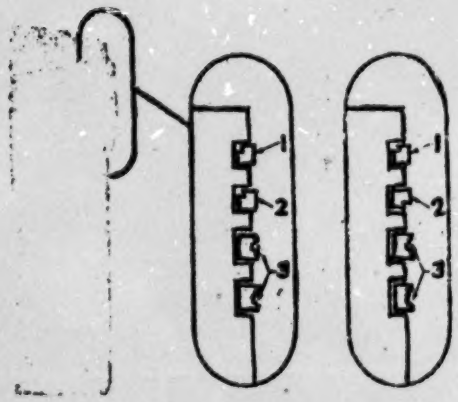


FIG. 1

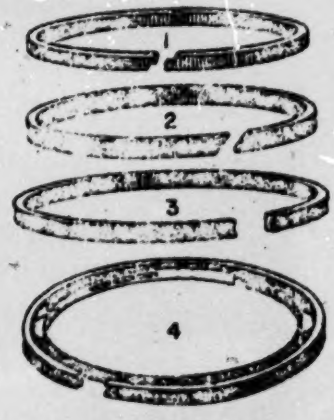
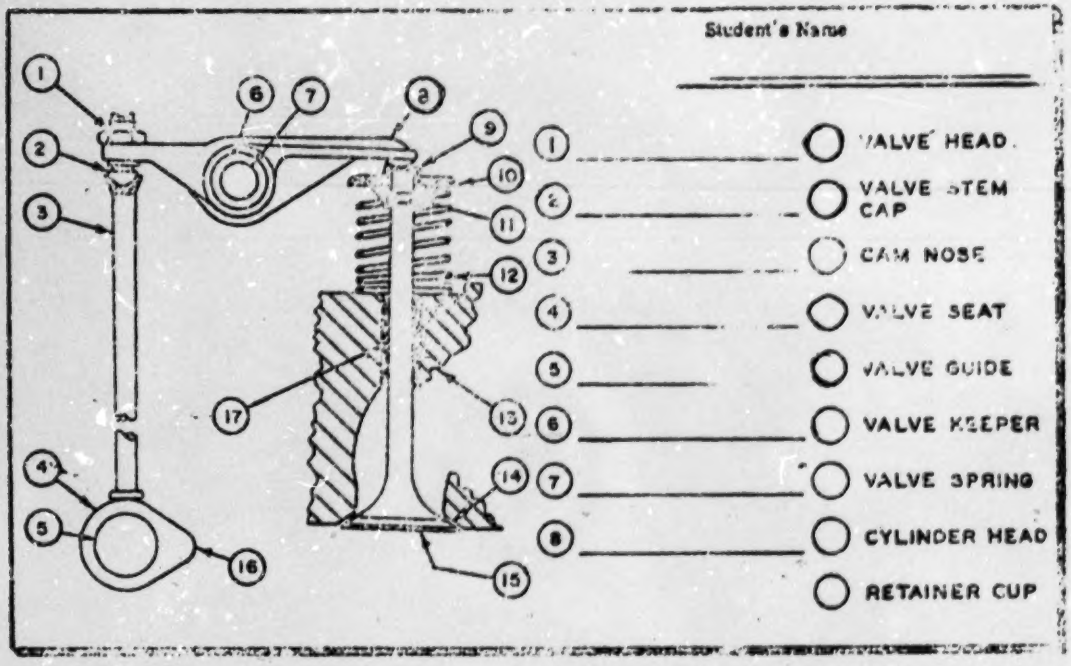


FIG. 2



ASSIGNMENT

A ◊ Study the drawing of the valve in head assembly.

B ◊ Identify parts numbered 1 through 8 by naming the parts in the space provided for each one.

C ◊ Insert the number in the encircled space next to the name of the part to which it corresponds.

REFERENCES	Pages
Automotive Fundamentals	37, 71, 76, 77
Automotive Mechanics	19, 32, 33

RELATED PROBLEMS

1. When the engine is being warmed up, do all units of the valve assembly expand at the same rate? Explain. _____

2. Why must the end of the rocker arm, contacting the valve stem, have a rounded surface? _____

3. Will a bent or worn push rod increase or decrease the lift of a valve? _____

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 3.0 Engine Construction

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
3.1	Given a print out of the events that take place in a 4 stroke cycle engine, the student will identify each stroke and relate parts with 100% accuracy.	3.1	See attached print out.
3.2	Given a list of parts, the student will select with 80% accuracy those pertaining to an engine.	3.2	Circle those parts found in an air-cooled engine: 1. wheel 2. camshaft 3. valve (poppet) 4. cylinder 5. transmission 6. oil pump 7. radiator 8. flywheel 9. cylinder fins 10. cam lobe
3.3	Given the problem of sketching each event in a 4-stroke cycle engine, the student will correctly locate the parts in their relationship to each other.	3.3	Sketch each event in a 4-stroke cycle engine.

ENGINE CONSTRUCTION

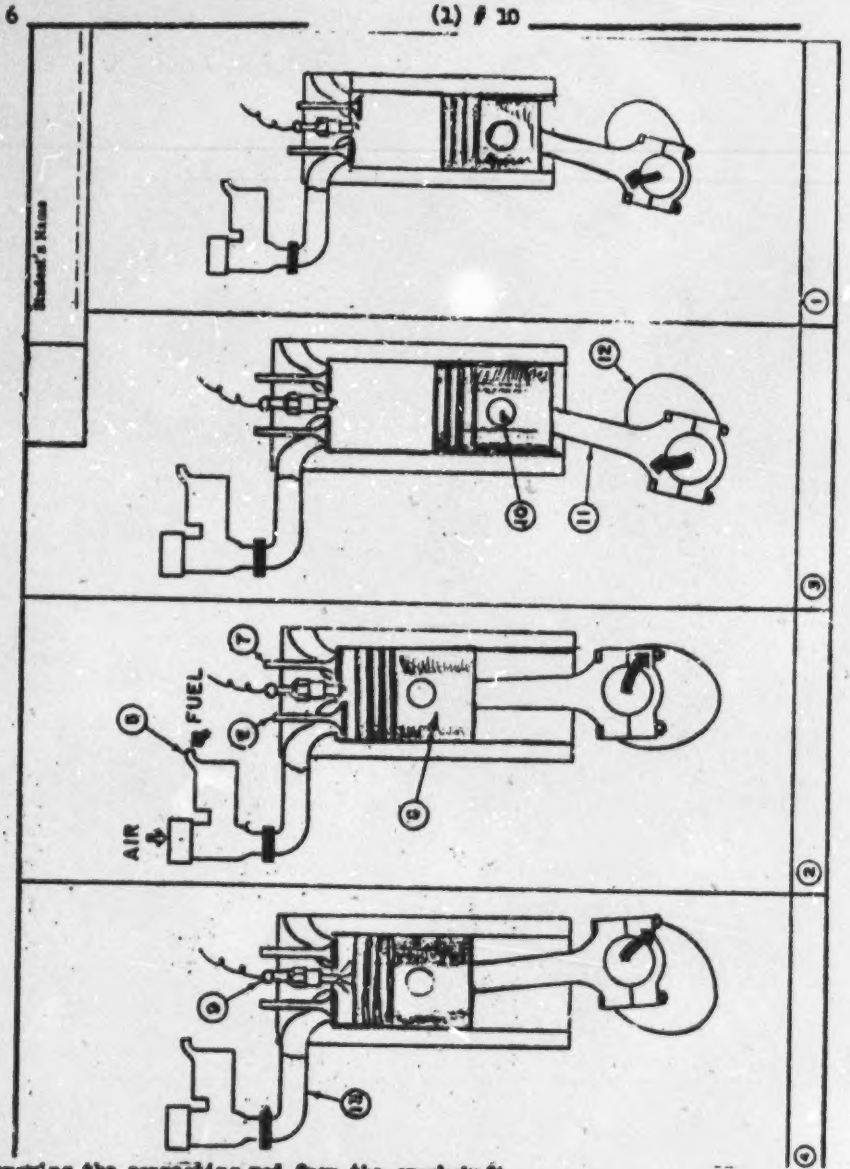
UNIT EXAMINATION (TYPICAL) Insert the number in the space next to the name of the part to which it corresponds on this sheet.

(a) COMPRESSION STROKE	( )	(b) EXHAUST STROKE	( )
(c) INTAKE STROKE	( )	(d) POWER STROKE	( )
(e) PISTON SKIRT	( )	(f) CRANKSHAFT	( )
(g) CARBURETOR	( )	(h) CONNECTING ROD	( )

Insert the name of the part to which the number corresponds... in the space below.

(i) # 13 _____ (j) # 9 _____

(k) # 6 _____ (l) # 10 _____



When removing the connecting rod from the crankshaft, -
(a) the piston pin lock must be removed first
(b) the tang on the lock bolts or screws must be bent down
(c) the ring compressor should be installed

(answer)

The assembly marks on the connecting rod -
(a) must match those on the rod cap
(b) are used to align the piston ring gap
(c) must match the timing marks

(answer)

Which of the following statements is correct?
(a) Honing a cylinder can be done with a portable electric drill but it is easier to use a drill press. The finished appearance should be free of cross-hatching.
(b) If a boring bar is used, a hone must be used after the boring operation to produce the proper cylinder wall finish.

(answer)

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 4.0 Ignition

Upon completion of the Ignition Unit of instruction 90% of the students will answer 75% of attached criterion test correctly. In addition trainee will disassemble, time and assemble the ignition system on three different make engines. Procedures required will be 100% complete as defined.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
.1	List the basic items required to complete a magnetic ignition circuit.	4.1	Sketch and name those items necessary to complete a magneto ignition circuit.
.2	Given a print out, identify special tools used for ignition inspection.	4.2	In the blank next to the picture of special tools insert the proper name of ignition tools only.
.3	Given test equipment the student will demonstrate ability to follow instruction manual and properly use test equipment.	4.3	Use the Merc-O-Tronic Tester to: a. make a continuity check b. check a condenser c. check a coil
.4	Determine a "hot" plug by interpreting a print out of three plugs	4.4	Attached test.
4.5	Choose the correct order of trouble shooting an ignition problem out of 3 given methods.	4.5	Select the correct order of trouble shooting an ignition system from the 3 given methods. 1. governor adjustment carburetor adjustment spark plug point adjustment 2. point adjustment spark plug compression test . 3. spark spark plug compression
.6	The learner will disassemble, time and assemble the ignition system on three different given engines with 100% accuracy.	4.6	Disassemble, time and reassemble the 3 different engines assigned you.

4.0

CRITERION TEST

1. Explain the difference in a "hot" plug and a "cold" spark plug.

2. The terms "hot" and "cold" refer to what feature of a spark plug?

3. Name the two types of ignition systems used with gasoline engines.

4. Give a brief explanation of how the two types of ignition systems operate.

5. What type of electric current is used in each type of ignition system?

6. How many volts are generally needed to jump a spark plug gap?

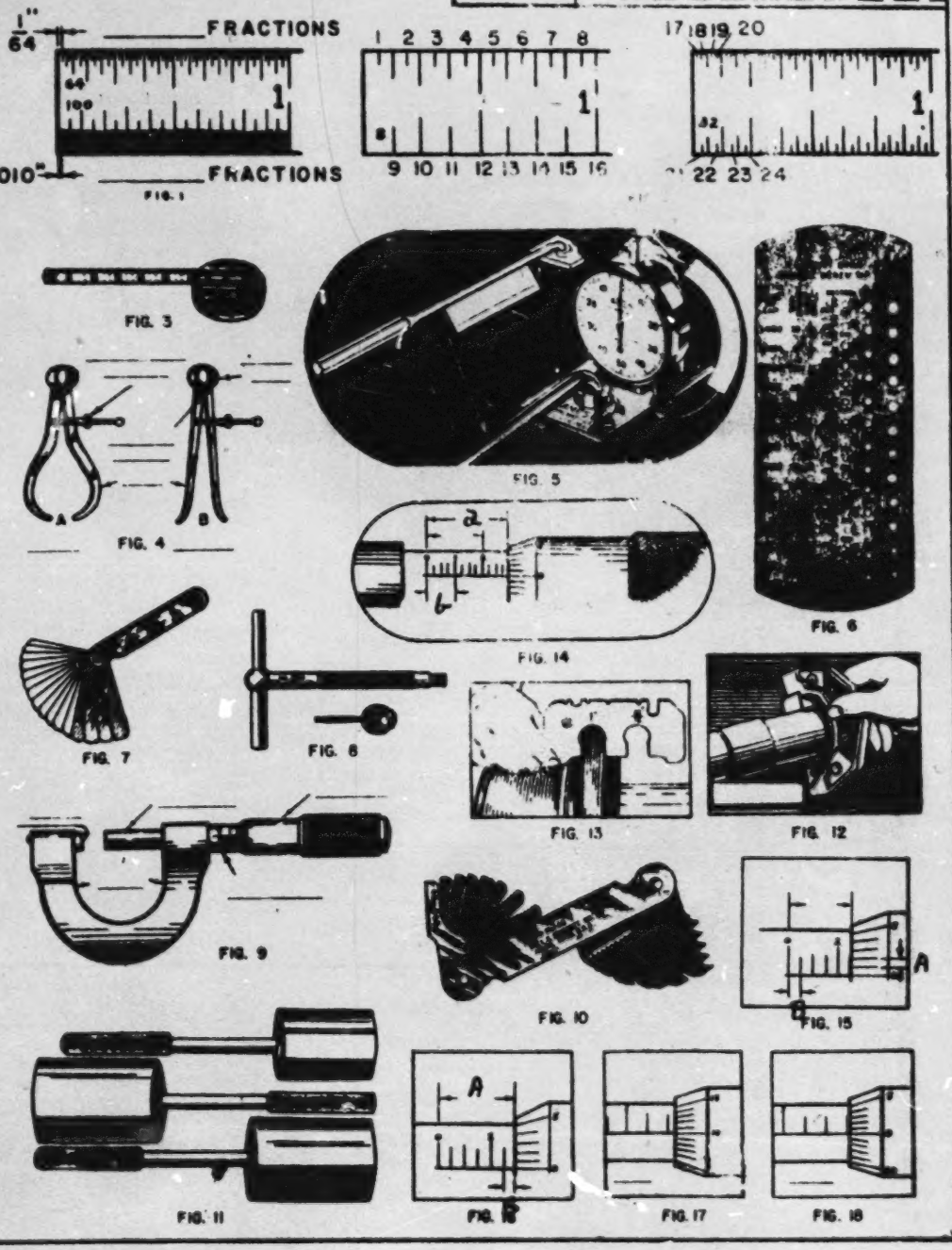
7. Name the three stages of a magneto operation.

8. Name 3 ways a small engine ignition system can fail.

9. Explain briefly a flywheel type of ignition.

10. Explain a quick ignition test that can be made for an engine that is missing.

Student s Name



Student's Name _____

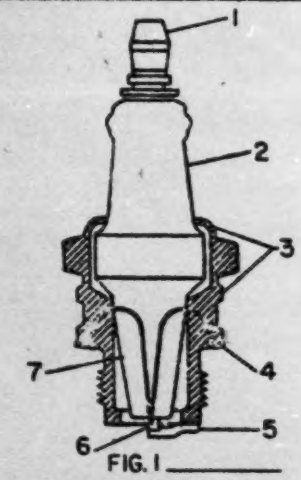


FIG. 1 _____

FIG. 2 _____

FIG. 3 _____

ASSIGNMENT

A Study the pages and illustrations in the references cited.

B Label Figures 1, 2 and 3 to indicate the heat range.

REFERENCES	Pages
Automotive Fundamentals	336, 337
Automotive Mechanics	298-301

C Name the spark plug parts in the columns so that the number of the parts in Figure 1 correspond with the numbered lines in the columns.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

RELATED PROBLEMS

Where a statement is true, encircle the T; where a statement or any part of a statement is false, encircle the F.

1. A plug designed for a hot engine has a shorter insulator firing tip. T F
2. Variation in the speed of heat transfer from the plugs to the cooling system is the heat range of spark plugs. T F
3. Plugs designed for aluminum heads have more threads than those designed for cast iron. T F
4. The final selection of the proper "heat range" should be governed by the actual operating conditions of the vehicle involved. T F
5. It is never advisable to deviate from the recommended plug heat range. T F

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

Fuel System

85% of the learners will complete with 75% accuracy a written test on carburetor systems and fuels, will disassemble, identify parts and reassemble a given carburetor, and will diagnose and repair a malfunction in a given carburetor.

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		5.0	1. Describe the purpose of the carburetor. 2. Name the parts in the fuel system. 3. The float type carburetor uses _____ fuel pressure. 4. The suction type carburetor is easily identified by it's location to the _____. 5. _____pressure working on a diaphragm produces fuel pressure for the McColloch chain saw. 6. A ruptured diaphragm in a fuel pump is detected by: (see attached) 7. The initial carburetor adjustments of the following are: (See attached) 8. After an overhaul performed on a carburetor, the engine will not run. The cause could be: (See attached) 9. The purpose of the _____ is to increase the speed of the air flow and decrease the pressure in the carburetor throat. 10. The 3 things necessary for the operation of an internal combustion engine are: Select 1 answer: a. oil, water, fuel b. air, fuel, ignition c. fuel, air, water 11. Pressures and temperatures are lowest in the cylinder during the _____ stroke. 12. In the float type carburetor the proper fuel level is maintained in the float chamber by the _____valve.

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

Fuel System

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
5.1	The student will demonstrate his understanding of the composition of fuels, proper handling of and its application to internal combustion engines by 75% accuracy on a criterion referenced exam.	5.1	1. List 2 fuels used in small air-cooled engines: (1)_____ (2)_____ 2. As a result of combustion gasoline produces carbon monoxide, or CO, which is a _____ poisonous gas. 3. 15 parts of this gas to 10,000 parts of air can cause quick paralysis or _____. 4. Can you tell by the odor whether or not carbon monoxide is present in a room? Yes No 5. Which liquid evaporates most rapidly? (1) water (2) gasoline (3) oil 6. Rags, especially those which have been used around fuels, are subject to spontaneous combustion, therefore, extreme care must be taken in their _____. 7. Gasoline should be stored in: a. a closed metal container b. a closed glass container c. a closed plastic container 8. An _____ cleaner is mounted on the carburetor to screen out dust and grit.

ACCREDITATION NUMBER 9363

COURSE TITLE: GASOLINE ENGINE MECHANICS - BASIC

TERMINAL PERFORMANCE OBJECTIVE NO. 5.0

Fuel System

NO.	INTERMEDIATE PERFORMANCE OBJECTIVES	NO.	CRITERION MEASURES
		5.1	(cont'd) 9. The cleaner also acts as a flame arrester in case the engine _____ through the carburetor. 10. When a liquid changes to _____ it is said to evaporate.
5.2	Given a carburetor student will disassemble completely, identifying each part by name and function, then reassemble and adjust to manufacturers specifications.	5.2	Disassemble the carburetor given you, identify each part as to name and function and then reassemble to manufacturers specifications.
5.3	The student will diagnose malfunction (previously created by instructor) on an installed carburetor, and make proper repair/ adjustment so that the engine will run.	5.3	Diagnose the malfunction in the carburetor assigned you, then make proper repairs and/or adjustments so that the engine will run.
5.4	The student from memory will draw a sketch of a fuel system labeling by name the main components with 100% accuracy.	5.4	Draw a sketch of a fuel system labeling each component.
5.5	Given a two-cycle engine the student will determine the proper fuel-oil mixture by utilizing the Handbook of Service Instructions for that specific engine.	5.5	Use the proper service manual to determine the proper oil-fuel mixture for the engine assigned you.

- T E S T -

(typical)

1. In this problem, put the letter of the correct answer to repair the problem in the blank at the right side of the paper.

PROBLEM

A. Hard starting, kickback, or will not start _____.
B. Noise under acceleration _____.
C. Vibrati(_____.
D. Poor or no compression. _____.
E. Spark does not occur _____.

REPAIR

A. Incorrect armature air gap
B. Loose spark plug
C. Condenser failure
D. Sheared flywheel key
E. Oversize or worn coupling
F. Broken connecting rod
G. Bent cutter blade
H. Loose blade